## STATEMENT OF THE CLAIMS

**Claim 1 (original)** A method for high-shear mixing and reacting of materials comprising:

supplying a first material to a flow path constituted by an interdiffusion passage between two closely spaced stationary surfaces at a respective first flow rate;

supplying a second material to the flow path through the interdiffusion passage at a respective second flow rate, to be interdiffused with the first material therein, with resultant material from the interdiffusion and any consequent reaction moving in the flow path at a respective resultant flow rate;

wherein the first and the second materials, and material resulting from interdiffusion and any consequent reaction of the materials, form respective boundary layers against both surfaces;

wherein the radial spacing between the two surfaces is equal to or less than the back-to-back radial thicknesses of the two boundary layers of material against the two surfaces, and if larger than the back-to-back radial thicknesses with a third layer between the two boundary layers has the third layer too thin to support turbulent convection or to cause channeling; and

wherein the flow rates of the materials in the flow path are such that they are subjected to laminar shear of the value required for the interdiffusion.

**Claim 2 (original)** A method as claimed in claim 1, wherein the two spaced stationary surfaces are provided by two cylindrical apparatus members mounted one within the other, whereby the inner surface of the outer member and the outer surface of the inner member constitute two parallel, closely spaced smooth surfaces providing an annular interdiffusion passage constituting the flow path for the materials.

**Claim 3 (original)** A method as claimed in claim 1, wherein the flow rates of the materials are such that their median linear velocity between the two spaced stationary surfaces is at least 5.0 meters per second.

**Claim 4 (original)** A method as claimed in claim 1, wherein the smoothness of the spaced stationary surfaces is 10 microinches or less.

**Claim 5 (original)** A method as claimed in claim 4, wherein the smoothness of the spaced stationary surfaces is 5 microinches or less.

**Claim 6 (original)** A method as claimed in claim 1, wherein one of the materials supplied to the flow passage is an auxiliary gas supplied thereto under sufficient pressure to produce the required flow rate of the other material or materials in the flow passage.

**Claim 7 (original)** A method as claimed in claim 1, wherein the required flow rate of the materials in the flow passage results from an increase in volume of the materials in the flow passage resulting from reaction between the materials.

**Claim 8 (original)** A method as claimed in claim 7, wherein the required flow rate of the materials in the flow passage results from an increase in volume of the materials in the passage resulting from the production of a gaseous reaction product from reaction between the materials.

**Claim 9 (original)** Apparatus for high-shear mixing and reacting of materials comprising:

apparatus structure providing two parallel, closely spaced stationary surfaces constituting between them a flow path that is an interdiffusion passage;

means supplying a first material to the flow path through the interdiffusion passage at a respective first flow rate;

means supplying a second material to the flow path through the interdiffusion passage at a respective second flow rate, to be interdiffused with the first material therein, with resultant material from the interdiffusion and any consequent reaction moving in the flow path at a respective resultant flow rate;

wherein the first and the second materials, and material resulting from interdiffusion and any consequent reaction of the materials, form respective boundary layers against both surfaces;

wherein the radial spacing between the two surfaces is equal to or less than the back-to-back radial thicknesses of the two boundary layers of the material against the two surfaces, and if larger than the back-to-back radial thicknesses with a third layer between the two boundary layers has the third layer too thin to support turbulent convection or to cause channeling; and

wherein the means supplying the first and second materials supply those materials at flow rates such that the materials in the passage are subjected to laminar shear of the value required for the interdiffusion.

**Claim 10 (original)** Apparatus as claimed in claim 9, wherein the two spaced surfaces comprise two cylindrical apparatus members mounted one within the other, with the inner surface of the outer member and the outer surface of the inner member constituting two parallel, closely spaced smooth surfaces providing an annular interdiffusion passage between them.

**Claim 11 (original)** Apparatus as claimed in claim 9, wherein the flow rates of the materials are such that their linear velocity between the two spaced stationary surfaces is at least 5.0 meters per second.

**Claim 12 (original)** Apparatus as claimed in claim 9, wherein the smoothness of the surfaces is 10 microinches or less.

**Claim 13 (original)** Apparatus as claimed in claim 12, wherein the smoothness of the surfaces is 5 microinches or less.

**Claim 14 (original)** Apparatus as claimed in claim 9, wherein one of the materials supplied to the flow passage is an auxiliary gas supplied thereto under sufficient pressure to produce the required flow rate of the other material or materials in the flow passage.

**Claim 15 (original)** Apparatus as claimed in claim 14, wherein the required flow rate of the materials in the flow passage results from an increase in volume of the materials in the flow passage produced by chemical reaction between the materials.

**Claim 16 (original)** Apparatus as claimed in claim 9, wherein the required flow rate of the materials in the flow passage results from an increase in volume of the materials in the passage resulting from the production of a gaseous reaction product from chemical reaction between the materials.

**Claim 17 (original)** A method as claimed in claim 1, wherein the two closely spaced stationary surfaces are parallel.